Are metallic ruthenates really simple?

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Several ruthenates and related 4d transition metal oxides show seemingly simple quasi-two-dimensional Fermi-liquid like electronic properties. High-resolution angle resolved photoemission data of Sr2RhO4, supported by de Haas van Alven measurements, demonstrate that this does not imply a quantitative agreement of the experimental Fermi surface with state-of-the-art band structure calculations within the local density approximation. This finding is particularly relevant in light of the recent discussion on the fermiology of NaxCoO2, which has a closely related electronic configuration.

The second part of the talk focuses on ultra-pure samples of the bilayer ruthenate Ca3Ru2O7, where we observed a semi-metallic ground state with extremely low quasiparticle residue Z. A highly nested ‘underlying’ Fermi surface and the temperature and momentum dependent opening of a small gap, indicate that the unusually low carrier density of Ca3Ru2O7 is the consequence of a Peierls like instability, gapping away large parts of the Fermi surface.